No. 7900074

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

World Seeds, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF Seventeen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS DESIGNATED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

COMMON WHEAT

'World Seeds 13'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington *this* 26th *day of* June *in the year of our Lord one thousand nine hundred and* eighty.

Attest:

Commissioner
Plant Variety Protection Office
Grain Division

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

FORM APPROVED
OMB NO. 40-R3822

No certificate for plant variety protection may be issued unless a completed application form has been received (5 U.S.C. 553).

INSTRUCTIONS: *See Reverse.*

FOR OFFICIAL USE ONLY

1a. TEMPORARY DESIGNATION OF VARIETY: MP-133 AND/OR MP-1338

1b. VARIETY NAME: WORLD SEEDS 13
ABBREV. WS-13

PV NUMBER: 7900074

2. KIND NAME: SOFT WHITE SPRING WHEAT

3. GENUS AND SPECIES NAME: TRITICUM AESTIVUM L. EMM THELL. SSP VULGARE (VILL., HOST

FILING DATE: 4-16-79

TIME: 3:30 A.M. (P.M)

4. FAMILY NAME (BOTANICAL): GRAMINEAE

5. DATE OF DETERMINATION MACKEY: AUGUST, 1975

FEE RECEIVED: $ 500.00
$ 250.00

DATE: 4-16-79
5/28/80

6. NAME OF APPLICANT(S): WORLD SEEDS, INC.

7. ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*): 6361 YARROW DR-SUITE D
CARLSBAD, CA 92008

8. TELEPHONE AREA CODE AND NUMBER: 714/438-0239

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: (*Corporation, partnership, association, etc.*) CORPORATION

10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION: MINNESOTA-AUGUST 1, 1972

11. DATE OF INCORPORATION: AUGUST 1, 1972

12. NAME AND MAILING ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS: ALFREDO GARCIA
VICE-PRESIDENT RESEARCH., WORLD SEEDS, INC.
6361 YARROW DR-SUITE D. CARLSBAD, CA 92008

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- [X] 13A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
- [X] 13B. Exhibit B, Novelty Statement.
- [X] 13C. Exhibit C, Objective Description of the Variety *(Request form from Plant Variety Protection Office.)*
- [X] 13D. Exhibit D, Additional Description of the Variety.

14a. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a). (If "Yes," answer 14B and 14C below.)* [X] YES [ ] NO

14b. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? [X] YES [ ] NO

14c. IF "YES," TO 14B, HOW MANY GENERATIONS OF PRODUCTION BEYOND BREEDER SEED? [X] FOUNDATION [X] REGISTERED [X] CERTIFIED

15a. DID THE APPLICANT(S) FILE FOR PROTECTION OF THIS VARIETY IN OTHER COUNTRIES? [ ] YES [X] NO *(If "Yes," give name of countries and dates.)*

15b. HAVE RIGHTS BEEN GRANTED THIS VARIETY IN OTHER COUNTRIES? [ ] YES [X] NO *(If "Yes," give name of countries and dates.)*

16. DOES THE APPLICANT(S) AGREE TO THE PUBLICATION OF HIS/HER (THEIR) NAME(S) AND ADDRESS IN THE OFFICIAL JOURNAL? [X] YES [ ] NO

17. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

Alfredo Garcia
(SIGNATURE OF APPLICANT)

MARCH 5, 1979
(DATE)

(SIGNATURE OF APPLICANT)

(DATE)

FORM GR-470 (1-78)

INSTRUCTIONS

GENERAL: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and $500 fee ($250 filing fee and $250 examination fee) to U.S. Dept. of Agriculture, Agricultural Marketing Service, Livestock, Poultry, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM

5 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.

13a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.

13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

13c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.

13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as, plant habit, plant color, disease resistance, etc.

14a If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "NO," he may change his choice. (See section 180.16 of the Regulations and Rules of Practice.)

15a See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

21-A1

ORIGIN, CROSS AND BREEDING HISTORY OF WS-13

Origin

WS-13 originated from a hand-made cross in Salinas, California, during the 1966-1967 growing season.

Cross (Parents)

WS-13 was selected from a cross between two F1's involving three high yielding Mexican Spring Wheat varieties. The cross was made in the following direction:

(F1, Pitic 62 x Inia 66) x (F1, Super X x Inia 66)

Brief Description of the Parents:

Pitic 62.

The first semi-dwarf variety (along with Cajeme 62) released in Mexico in 1962. It is a very high yielding variety throughout the world. Its two great weaknesses are low test weight, even when grown under optimum growing conditions, and very poor quality for bread making.

Inia 66.

A semi-dwarf and very early variety released in Mexico in 1966. Because of its high protein and strong gluten, it is ideal for blending with low protein and weak gluten varieties in the bread making process. This variety is also widely adapted, but it must be harvested on time to avoid losing grain due to shattering.

Super X.

As far as we know, this variety was never officially released in Mexico. Phenotypically speaking, Super X is almost identical to Siete Cerros 66. In order to identify them, one must check the kernels. Super X is red, while Siete Cerros 66 is white. Super X is a semi-dwarf

and very high yielding variety. Because of its stiff straw, it has very good resistance to lodging.

DETAIL STAGES OF BREEDING HISTORY

(F1 through F8 generations)

F1 Generation.

The first generation was grown in Encinitas, California, in 1967-1968. We space planted about 80 kernels in a single row, 20 feet long x 18 inches wide. The entire row was bulked to secure seed for the next generation.

F2 Generation.

The F2 generation was planted in 1969 at the farm of Mr. Arthur Greenberg, in Grand Forks, North Dakota. In order to facilitate the selection of individual plants, we spaced the seed in rows, 20 feet by 22 inches wide each. We seeded a total of 60 rows, placing from 80 to 100 seeds per row. This gave us an F2 population of 4,800 to 6,000 plants.

An additional 3,600 F2 plants were grown at Holtville, California, in 1969-1970. This makes a total F2 population of about 10,000 plants for this particular cross. This second group of F2's followed a different route than those grown at Grand Forks and did not lead to the selection of WS-13, therefore, we shall make no further references to them in this report.

According to our records, the F2 population was identified as follows:

F2, 6W03113

where 6W stands for Hexaploid hybrid wheat and 03113 is the permanent number assigned to the F2 generation. This number will never be assigned to another F2 even if such population is totally discarded. Notice that we have plenty of room for 99,999 future F2's.

F3 Generation.

From then on, we selected either individual plants or heads and each selection was recorded under the "Pedigree Method of Selection". We selected a total of 83 individual F3 plants. Out of these, we discarded 25 in the laboratory because of poor seed development. The remaining plants were numbered at random from 1 to 58.

We are concerned here with one specific plant, the one from which WS-13 originated. Therefore, from now on we shall write only the pedigree of that particular selection. The pedigree for the F3 was recorded as follows:

F3, 6W03113-21

where the number 2 always preceeds all selections made in North Dakota. The 58 single F3 selections were planted at Holtville, California, in 1969-1970, We seeded three rows per plant and from 80 to 100 kernels per row, 20' x 18" each. We studied from 13,000 to 17,000 plants in the 3rd generation.

F4 Generation.

We selected 462 individual heads from the entire population. The heads were numbered at random from 1 to 462. The pedigree for the F4 generation is written below:

F4, 6W03113-21-11

In the above pedigree, the number 1 always preceeds all selections made at the Imperial Valley of Southern California.

The 462 selections were again planted at Holtville, California in 1971-1972. Each head was planted in rows, 20' x 18" each.

F5 Generation.

We selected a total of 868 single heads from the F4 generation. Each head was planted back in the same location in 1972-1973. We planted one head to a row, 20' x 18" each. The pedigree for this generation stands as follows:

F5, 6W03113-21-11-15

F6 Generation.

From the entire F5 population, we selected 694 individual F6 plants. Seed from each plant was carefully checked in the laboratory and 188 of them were discarded because they showed either a high percentage of black point or it was badly shrunken or both. It is interesting to mention that from that particular row we are concerned with, we selected only three plants and one of them was discarded because of shrunken kernels. The 506 plants saved were again planted at Holtville in 1973-1974. Frome each plant we seeded two-row plots, 20' x 18" each row. We space planted from 80 to 100 per row, the rest of the seed was kept in reserve. We seeded around 91,000 plants for the entire F6 population (506 x 2 rows each x 90 kernels). The pedigree for this generation can be written as follows:

F6, 6W03113-21-11-15-12

F7 Generation.

We cut five heads from every promising two-row plot, ending up with a total of 1,155 individual F7 selections. After the heads were selected, we bulked only one row out of every two-row plots. The other row was left standing up to observe shattering. Seed from each of the 226 bulked rows was used to run preliminary yield trials which were planted at Brawley, California (part of the Imperial Valley) in 1974-1975. The individual heads were also planted at the same location and in single rows, 20'

x 18" each. At this stage we have two pedigrees; one for the rows that were bulked for preliminary yield trials and the other for the selections made out fo that row before it was bulked. These will be selected further, but only if their respective bulks yield above what ever variety(s) is used as a check. The two pedigrees are written below:

Pedigree for the bulked row:

F7B, 6W03113-21-11-15-12-1B

The B in the pedigree indicates that the seed was bulked at the F7 generation when grown at the Imperial Valley as indicated by the preceeding number 1.

The pedigree of the five individual heads selected from the above row before it was bulked is:

F7, 6W03113-21-11-15-12-11
" -12
" -13
" -14 (Bulked Further)
" -15

F8 Generation.

Many of the F7B lines tested in replicated yield trials in 1974-1975 proved to be superior to the variety Anza, widely grown in California. Based on these preliminary trials, we proceeded to harvest their respective selections. For the entire cross, we selected 455 single plants and bulked 453 individual rows, which were again included in yield trials at Holtville, California, in 1976-1977. Results of these and previous trials are reported somewhere else in this report.

For the most part, we selected only one plant for every row harvested. In a few cases, we selected two plants or single heads.

According to our records, the final pedigree stands as follows:

F8B, 6W03113-21-11-15-12-14-1B

Out of one single row, 20' x 18", we obtained 4.20 pounds of stock seed. This seed was increased further, as explained under "Procedures for Maintaining and Producing Stock Seed Classes."

SUMMARY OF BREEDING HISTORY

Cross: (Pitic 62 x Inia 66) x (Super X x Inia 66)

Pedigree: F8B, 6W03113-21-11-15-12-14-1B

Generation	Year, Grown At:	Year and Generation Harvested	Quality Evaluation
F1	1967-1968 Encinitas, CA	1968, F2	None
F2	1969, Grand Forks, ND	1969, F3	None
F3	1969-70, Holtville, CA	1970, F4	None
F4	1971-72, Holtville, CA	1972, F5	None
F5	1972-73, Holtville, CA	1973, F6	None
F6	1973-74, Holtville, CA	1974, F7	None
F7B	1974-75, Brawley, CA Preliminary Yield Trials	1975, F7B	Preliminary
F7	1974-75, Brawley, CA	1975, F8B Original Stock Seed	None
F8B	1975, Carlsbad, CA Preliminary Increase of Original Stock Seed	1976, F8B Breeder's Seed	None

EVIDENCE OF UNIFORMITY AND STABILITY

We have found no evidence of any variants during reproduction and multiplication of WS-13. This variety seems very stable for major agronomic characteristics such as heading, physiologic maturity and height as presented under 13D(1) of this report. Therefore, any variants in plant type and/or kernel color which might be found during reproduction of WS-13 should be due to mechanical seed mixing during planting and/or harvesting. Natural hybrids with other wheat varieties might also represent a source of variants on WS-13.

INFORMATION TO ASSIST FIELD INSPECTORS

WS-13 does not show any outstanding identifying characteristics. We find that this variety is most similar to the Spring Wheat varieties WS-1, Inia 66 and Pitic 62. The following contrasting characteristics should help to distinguish them in the field:

Contrasting Character	WS-13	WS-1	Inia 66	Pitic 62
Awns, Av. of Extreme Lengths	126 mm	100 mm	-------	--------
Spike Shape	Oblong to Fusiform	Oblong	-------	--------
Shoulder Shape	Square to Apiculate	Wanting	-------	--------
Kernel Color (1)	White	White	Red	Red

(1) WS-13 is classified as a soft-white variety. The color of the kernel varies under different fertility levels. One should expect to find typical white kernels under very low fertility. As we increased the fertilizers, therefore, the protein content, the kernels became amber and probably some pintos or yellow berries in between.

Temporary Designation: MP 133 and/or MP 133B
Variety Name: WORLD SEEDS 13

FORM APPROVED. OMB NO. 40-R3712

FORM GR-470-6 (2-15-73)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C (Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)
WORLD SEEDS, INC.

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)
6361 Yarrow Drive Suite D
Carlsbad, California 92008

FOR OFFICIAL USE ONLY
PVPO NUMBER 7900074
VARIETY NAME OR TEMPORARY DESIGNATION
WORLD SEEDS 13

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:
[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:
[1] 1 = SPRING 2 = WINTER 3 = OTHER (Specify) _____ [3] 1 = SOFT 2 = HARD 3 = OTHER (Specify) Semi hard-
[1] 1 = WHITE 2 = RED 3 = OTHER (Specify) _____ Kernel color varies from white to amber under low or high fertility levels, respectively.

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:
[1][0][4] FIRST FLOWERING Under short days [1][1][2] LAST FLOWERING

4. MATURITY (50% Flowering):
[ ][ ] NO. OF DAYS *EARLIER* THAN ..... [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS
[0][4] NO. OF DAYS *LATER* THAN Under short days [3] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):
[0][9][7] CM. HIGH
[ ][ ] CM. TALLER THAN ..... [ ] 1 = ARTHUR 2 = SCOUT 3 = CHRIS
[4][0] CM. SHORTER THAN ..... [3] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):
[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:
[1] 1 = YELLOW 2 = PURPLE

8. STEM:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[0][4] NO. OF NODES (Originating from node above ground)
[2][2] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:
[2] Anthocyanin: 1 = ABSENT 2 = PRESENT
[1] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:
[2] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (Specify): _____
[2] Flag leaf: 1 = NOT TWISTED 2 = TWISTED
[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
[1][9] MM. LEAF WIDTH (First leaf below flag leaf)
[3][1] CM. LEAF LENGTH (First leaf below flag leaf):

FORM GR-470-6 (REVERSE)

11. HEAD:

[3] Density: 1 = LAX 2 = DENSE 3=Middense

[2] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[1] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

[1][3] CM. LENGTH [1][5] MM. WIDTH

12. GLUMES AT MATURITY:

[3] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[3] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[4-5-6] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[3] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[2] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[1] Shape; 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[1] Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[12] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[0][7.25] MM. LENGTH [0][3.8] MM. WIDTH [4][6] GM. PER 1000 SEEDS

17. SEED CREASE:

[2] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[2] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[2] STEM RUST (Races) _____ [1] LEAF RUST (Races) _____ [2] STRIPE RUST (Races) _____ [0] LOOSE SMUT

[0] POWDERY MILDEW [0] BUNT [ ] OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY [0] APHID (Bydv.) [0] GREEN BUG [0] CEREAL LEAF BEETLE

[0] OTHER (Specify) _____ HESSIAN FLY RACES: [ ] GP [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering		Seed size	
Leaf size		Seed shape	
Leaf color		Coleoptile elongation	
Leaf carriage		Seedling pigmentation	

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. *(See attachment.)*

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

Botanical Classification of World Seeds 13 (1)

Variety Experimental Designation: MP-133 and/or MP-133B

Variety Official Name: World Seeds 13

Variety Name Abbreviation: WS-13

I. Plant Characters:

1. Maturity: Midseason
2. Height: Midtall (Semi-dwarf variety carrying one main gene for short straw)
3. Habit of Growth: Spring.

II. Stem Characters:

1. Color: White
2. Strength: Strong
3. Hollowness: Hollow

III. Spike Characters:

1. Awnedness: Awned, awns white, average of extreme lengths 126 mm.
2. Shape: Oblong (strap) to Fusiform
3. Density: Middense
4. Position: Erect to Inclined
5. Shattering: Resistant

IV. Glume Characters:

1. Color: White
2. Length: Long, average 11.0 mm.
3. Width: Wide, average 4.2 mm.

Botanical Classification of World Seeds 13

V. Shoulder Characters:

1. Width: Narrow

2. Shape: Square, also some elevated and apiculate.

VI. Beak Characters:

1. Width: Narrow

2. Shape: Acuminate

3. Length:

Maximum: 11.0 mm.
Average: 7.9 mm.
Minimum: 6.0 mm.

VII. Kernel Characters:

1. Color: White, growing under low fertility levels;

Amber, growing under optimum fertility levels.

2. Length: Midlong, average 7.25 mm.

3. Texture: Semihard (See attached information as to how it was determined.)

4. Shape: Ovate

VIII. Germ Character:

1. Size: Midsize

IX. Crease Characters:

1. Width: Midwide

2. Depth: Middeep

X. Cheek Character:

1. Shape: Rounded

Botanical Classification of World Seeds 13

XI. Brush Characters:

1. Size: Midsized

2. Length: Midlong

3. Collar: None

(1) Reference Consulted:

BRIGGLE, L.W. and L.P. REITZ. 1963 Classification of Triticum Species and of Wheat Varieties Grown in the United States. Technical Bulletin No. 1278, U.S.D.A., Washington, D.C.

Saint Thomas, North Dakota 58276
Phone: 701/257-6708

World Seeds, Inc.

Research Center and Sales
2605 Oceanside Blvd.
Oceanside, California 92054
Phone: 714/757-5647

Mr. Larry W. Dosier
Examiner, Plant Variety
Protection Office
Grain Division
USDA, AMS
6525 Belcrest Road
Hyattsville, Maryland 10782

August 16, 1979

Subject: Wheat Application No. 7900074, 'World Seeds 13'.

Dear Mr. Dosier:

I have re-checked glume width, crease width and depth on World Seeds 13. The original descriptions are correct with the sole exception of glume width. The final width average comes to 4.2 mm as opposed to 4.0 mm stated earlier on the Botanical Description.

I also have re-checked the texture on this variety. Indeed, I found that it does not quite fit into any of the two main classifications of either soft or hard. It should be classified as semihard in texture. This departure from the normal classification can be explained by analysing the genealogy and the direction in which the cross was made.

First of all, let's point out that NO WHITE-GRAIN VARIETIES are involved in this cross. The parents of 'WS 13' are:

Pitic 62: A soft-red variety.

Inia 66: A hard-red variety with very strong gluten and high protein.

Super X: A soft-red variety. (Closely related to the white-grain variety Siete Cerros 66, which was not included in this cross.)

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The above three parents were crossed in the following manner:

(F1, Pitic 62 x Inia 66) X (F1, Super X x Inia 66)

Now, theoretically speaking, 'World Seeds 13' carries 25% Pitic 62, 25% Super X, and 50% of the strong gluten variety Inia 66 which may be responsible for the vitreous kernels and semi-hard texture.

Even though the above three varieties have red kernels, one would expect to recover white-grain lines among their progenies, but only if some or all of them carry different gene(s) for grain color. This has been the case with this particular cross. We handled thousands of plants from this cross and the germoplasm still contains promising white-grain lines, in fact, some of them have out yielded 'WS 13' by 10 to 15%.

Glume width and texture have been corrected on the attached classifications. I have added a brief paragraph explaining how texture was determined.

I appreciate your bringing the above matters to my attention.

Sincerely,

Alfredo Garcia
Vice President, Research

DETERMINATION OF TEXTURE ON WORLD SEEDS 13

Growing Conditions

The kernels analysed for texture were produced under relatively optimum growing conditions at Holtville, California in 1978-1979. The ground where World Seeds 13 was growing, was under alfalfa for five years. About 350 pounds of nitrogen per acre was applied to the soil at different growing stages. The entire crop was irrigated throughout the growing season.

Determination of Texture

The texture was determined by analysing the endosperm of cross sectioned kernels under a self-lighted magnifying glass. As reference, we analysed the endosperm of the Hard Red Spring Wheat Variety 'Waldron' growing under similar conditions.

The endosperm of World Seeds 13 is more vitreous than starchy, but not as glossy or semitranslucent as that of Waldron. This might be due to the fact that the vitreous condition observed on World Seeds 13 does not cover the entire endosperm.

We failed to detect any 'Yellow Berry' conditon as described by Briggle and Reitz.

From this analysis we concluded that the variety 'World Seeds 13' has a semihard texture.

Comparative yields and agronomic information between WS-13 and Anza Spring Wheat varieties grown under irrigation at Brawley and Holtville, California, in 1974-1975 and 1976-1977, respectively (1).

Variety	Yield, #1A		Yield Av.	% of Anza	Heading Physiologic Maturity (2) in days		Height		TW #/Bu
	1974-75	1976-77					cm	inches	
WS-13	8,310	5,454	6,882	111	110	155	97	38	62.10
Anza	7,715	4,646	6,180	100	107	152	91	36	63.40

(1) The varieties were arranged in a randomized block design including 25 varieties replicated four times.

(2) Both observations were taken when at least 50% of the plants in a plot showed the indicated characteristic. We considered heading the time when the spike just emerges from the boot stage and physiologic maturity when the neck or stem below the head turns lemon color.

CODE FOR LEAF AND STEM RUST ABBREVIATIONS

SEVERITY OF INFECTION OF RUST:

Given as percent of infection.

0-60		indicates variability in the percent of rust on plants in the row.
TR	=	Trace

RESPONSE:

R	=	Resistant
MR	=	Moderately Resistant
S	=	Susceptible
MS	=	Moderately Susceptible
-	=	Range, i.e.: 5R-50S means that there was a range of infection from plant to plant and/or on each plant from 5 percent resistant to 50 percent susceptible type infection.

For Leaf Spots, Black Chaff and Brown Necrosis:

0	=	The most resistant
4	=	The most susceptible

DISEASE REACTIONS OF WS-13 AND OTHER PRIVATE AND PUBLIC INSTITUTIONS' VARIETIES GROWING THROUGHOUT THE SPRING WHEAT AREAS OF THE UNITED STATES (1)

St. Thomas, North Dakota

Variety	1975 L. Rust	1975 S. Rust	1976 Stem Rust	1978 L. Rust	1978 S. Rust
WS-13	100S	55	0	100S	5MR
WS-25	0	0	0	----	0
Profit 75	0	0	0	-----	0
WS-1	5MS-MR	0	0	-----	0
WS-1877	5S	5S	5S-MS	TR	0
WS-6	0-5MS	5MS	0	----	---

Carlsbad, California

Variety	1975-1976 Mildew	1975-1976 L. Rust	1976-1977 L. Rust	1977-1978 L. Rust
WS-13	2+	-----	100S	100S
WS-25	1+	10S-MS	5-10MS	5MS-0
Profit 75	1	40MS	5MS	5MS-0
WS-1	--	-----	5MS-MR	20MS
WS-1877	--	100S	------	40S-100MS
WS-6	2	10S	0	5MR

(1) See code for leaf, stem and Yellow Stripe rusts readings on last page.

Common and Scientific Names for Above Diseases

L. Rust	Puccinia recondita
S. Rust	" graminis var. tritici
Yellow Stripe Rust	" glumarum
Mildew	Erysiphe graminis

Pasco, Washington

Variety	1977 Mildew(2)	Yellow S. Rust	L. Rust
WS-13	0	10MS	TR
WS-25	0	0	0
Profit 75	0	0	0
WS-1	0	0	5MS
WS-1877	0	0	0
WS-6	0	TR	TR
Twin	3	0	100S
Borah	0	0	TR
Wared	0	0	0
Urquie	1+	20S	100S

Othello, Washington

Variety	1977 L. Rust
WS-13	TR-0
WS-25	0
Profit 75	----
WS-1	40S
WS-1877	0
WS-6	10MS
Twin	100S
Borah	----
Wared	----
Urquie	100S

(2) For mildew, we used an arbitrary numerical scale of 0 through 4, where 0 = the most resistant, and 4 = the most suseptible.

Primary Use

The attached information on milling and baking indicates that WS-13 produces a low protein and weak flour for bread-making. Therefore, we recommend this variety only as a family flour for breakfast products such as cakes, cookies, biscuits, etc.

MILLING AND BAKING INFORMATION ON WS-13 AND ANZA

Spring Wheat varieties grown under irrigation at Brawley, California, in 1974-1975. Analysis preformed by Doty Laboratories, Inc., 1435 Clay Street No., Kansas City, MO 64116.

Grain	WS-13	ANZA
% Protein	11.95	12.70
% Flour Extraction	70.2	68.2
Flour		
Ash	0.482	0.419
% Protein	10.51	10.56
Color	91 yellow	96 creamy
Farinograph		
% Absorption	62.1	63.4
Mixing Peak in minutes	4 ¼	4 ½
Tolerance in minutes	5 ½	4 ½
Mixing Tolerance Index	45	75
Valorimeter	52	51
Baking		
Absorption	66.0	67.0
Loaf Volume c.c.	720	745
Crust Character	smooth	smooth
Crumb Color	91 yellow	96 creamy
Grain and Texture	close, even sl. harsh	close, even silky

MILLING REPORT

WS-13

"This wheat has very good milling properties."

Anza

"This wheat has very good milling properties."

REMARKS

WS-13

"This wheat has a slightly short dough mixing requirement. Properly mixed, it produces fairly strong doughs and a good loaf of bread. This wheat should prove satisfactory in a family mix, or it could be used in a baker's mix with stronger wheats."

Anza

"This wheat has a slightly short dough mixing requirement. Properly mixed, it produces fairly strong doughs and a very good loaf of bread. This wheat should prove satisfactory in a family mix, or it could be used in a baker's mix with stronger wheats."